



Calculating the ability of within-school teacher supply to meet the demands of new requirements: the example of the Michigan Merit Curriculum

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REL Midwest, in a partnership with Michigan State University, responded to a request from the Michigan Department of Education and the Center for Educational Performance and Information to identify potential shortfalls in full-time equivalent teachers based on new graduation requirements in Michigan.

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Summary

Representatives from the Michigan Department of Education and the Center for Educational Performance and Information requested assistance in estimating Michigan's capacity to adequately staff its high schools to meet the course requirements of the new Michigan Merit Curriculum. The study team devised a formula to estimate the number of additional full-time equivalent (FTE) teachers needed for each subject at each Michigan high school. The formula was calculated using Michigan-specific values for key variables. Such an analysis may be particularly useful when new graduation or course requirements are being planned. Schools can adjust the variables in the formula (such as class size and number of periods taught by each FTE teacher) to fit their own needs.

Analysis of data for Michigan high schools identified a number of schools that were potentially understaffed in some or all subjects. The results show that 25 percent (223) of schools were potentially undersupplied in FTE teachers in math, 7 percent (64) in English/language arts, 5 percent (41) in science, and 4 percent (39) in social studies. The results also show that 13 percent (70,619) of students attended schools that were potentially undersupplied in FTE teachers in both math and English/language arts, while 2 percent (12,182) of students were in schools that were potentially undersupplied in all core subject areas.

Technical brief

Why this brief?

This brief describes how to calculate a potential undersupply of full-time equivalent (FTE) teachers in core content areas based on state graduation requirements and provides examples. The Michigan Department of Education wanted to identify schools that might struggle to meet the staffing needs under the Michigan Merit Curriculum, which was in effect for students entering grade 9 in 2007/08. While most school districts in Michigan had graduation requirements before the introduction of the Michigan Merit Curriculum, the number and types of credits needed to graduate varied by district. The Michigan Merit Curriculum standardized the number and types of credits for graduation across the state. While this brief is based on Michigan's requirements, the formulas used and methods described are applicable to other states, providing potentially useful information to district and state education agency staff.

Calculating potential teacher undersupply

To calculate the potential undersupply of FTE teachers in a given school—defined as the difference between additional FTE teachers required and FTE teachers on staff—demand for FTE teachers, based on the state's graduation requirements, must first be calculated. The following formula estimates the number of FTE teachers needed in each school for key subject areas:

$$(1) \quad D_i = \frac{ax_i/y}{z}$$

where D_i is the number of FTE teachers needed to meet requirements in a subject area, a is the proportion of years that the student body is required to take in a given subject, x_i is the average student enrollment in a given school, y is the class size, and z is the number of periods taught per FTE teacher per day.

Consider the following examples. In each case 1 credit is equal to 0.25 of the total number of credits needed to graduate, class size is assumed to be 25 students, and each FTE teacher is assumed to teach five periods a day.¹ For the Michigan Merit Curriculum requirements of 4 credits in math and 4 credits in English/language arts to graduate, the calculation is as follows;

$$D_i = \frac{(1.0)(\text{enrollment}) / (25 \text{ students})}{5 \text{ periods per FTE teacher}} .$$

For the Michigan Merit Curriculum requirement of 3 credits in science and 3 credits in social studies, the calculation is as follows:²

$$D_i = \frac{(0.75)(\text{enrollment}) / (25 \text{ students})}{5 \text{ periods per FTE teacher}} .$$

Once the number of teachers needed to meet the requirements for a given school has been calculated, determining whether a school has a potential undersupply of FTE teachers is straightforward, using the following equation:

$$(2) \quad U_i = D_i - S_i$$

where D_i is the number of FTE teachers needed to meet requirements for each school, and S_i is the number of FTE teachers per subject assignment code per school.³ A positive result indicates undersupply, and a negative result indicates adequate teacher supply.

A school could be judged to have an undersupply of teachers in a given subject area if $U_i > 1$, although this is an arbitrary number that simply serves as an example. In other words if a school's difference between demand and supply is greater than one FTE teacher in a given subject area, there could be an undersupply of such teachers, net of possible measurement and estimation errors.

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Results: potential undersupply of full-time equivalent teachers by Michigan Merit Curriculum subject areas

Analyses were conducted for all Michigan schools housing grade 9–12 students for which adequate data were available to calculate potential undersupply of FTE teachers by Michigan Merit Curriculum subject areas (see box 1 for details on data collection). The calculations show that 25 percent (223) of schools were potentially undersupplied in FTE teachers in math, 7 percent (64) in English/language arts, 5 percent (41) in science, and 4 percent (39) in social studies (table 1). Some 6 percent (52) of schools were undersupplied in both math and English/language arts. Just 1 percent (9) of schools were potentially undersupplied in all core subject areas.

There were 268,031 students attending schools with a potential undersupply of FTE teachers in math (see table 1). Although the number of schools that were potentially undersupplied in math represented 25 percent of the population of schools, the number of students educated in these schools represented 50 percent of the total high school student population in the state. In English/language arts 15 percent (80,794) of students were being educated in schools that were potentially undersupplied in FTE teachers, in science 10 percent (51,378) of students were in potentially undersupplied schools, and in social studies 8 percent (45,049) of students were in potentially undersupplied schools. And 13 percent (70,619) of students attended schools that were potentially undersupplied in FTE teachers in both math and English/language arts, while 2 percent (12,182)

BOX 1

Data collection for Michigan high schools

In the examination of full-time equivalent (FTE) teacher potential undersupply for high schools in Michigan conducted during January–April 2008, schools were excluded from the analysis if they were missing data on average enrollment or other data necessary for completing the supply calculations. One hundred forty-seven schools, or about 14 percent of high schools in Michigan, were excluded because of missing data; 886 schools remained in the analysis.

The following procedures were used in analyzing the Michigan data:

- Every building with students enrolled in grades 9–12 was

included in the analysis. For example, a building with K–12 students was included in the grades 9–12 population. Thus, nontraditional schools, such as grade 9 campuses and alternative schools, were included in the analysis.

- The total number of students were obtained from the Public School K–12 Head Counts for each building (K–12 building files) using publicly available data (Center for Education Performance and Information 2008).

Full-time equivalent teachers in each subject assignment were summed by building or school code to ensure accurate calculations of total FTE teachers. Michigan Registry of Personnel data from the July 2007 collection were used.

Schools were classified as potentially undersupplied in a given subject area if the difference between demand and supply was greater than one FTE teacher. Given this assumption, potential undersupply seems to be more prevalent in math and English/language arts than in other subject areas. This potential undersupply is probably a consequence of Michigan Merit Curriculum's new requirements that students take four years of math and English/language arts.¹

Note:

1. One of the reasons for the potential undersupply in math and English/language arts may be that, according to multiple school web sites consulted, prior to introduction of the Michigan Merit Curriculum, many schools required two to three years of math and two to three years of English/language arts to graduate.

TABLE 1

Schools with a potential undersupply of full-time equivalent teachers by Michigan Merit Curriculum subject areas, 2006/07 (N = 886 schools)

Core subject	Schools without potential undersupply		Schools with potential undersupply		Students attending schools with potential undersupply ^a	
	Percent	Number	Percent	Number	Percent	Number
Math	75	663	25	223	50	268,031
English/language arts	93	822	7	64	15	80,794
Science	95	845	5	41	10	51,378
Social studies	96	847	4	39	8	45,049
Both math and English/language arts but not both science and social studies	94	834	6	52	13	70,619
Math and English/language and science and social studies	99	877	1	9	2	12,182

a. Total number of students (531,443) is taken from the sum of enrollments in the 886 schools in the analysis. Percentages refer to students in schools that are potentially undersupplied in the various areas.

Source: Authors' analysis based on data from Center for Education Performance and Information (2008).

of students were in schools that were potentially undersupplied in all core subject areas.

Conclusion

This technical brief provides a simple way to look for potential FTE staffing shortfalls in core subject areas at the school level. While unable to provide answers about why these gaps exist, the method presented here for identifying where gaps do exist is an important first step in providing timely and targeted help to schools that need it. Such an analysis may be particularly useful when planning new graduation or course requirements. Analysis of data for Michigan high schools identified a number of schools that were potentially understaffed in some or all subject areas. For example, 16 percent (82,801) of students attended the 7 percent (61) of schools that were undersupplied in both math and English/language arts (and possibly other core subjects). While this brief used data for Michigan, other states can apply the same methods to investigate similar issues by substituting values that match their specific graduation requirements and school-level details.

Notes

1. These assumptions were based on data from Michigan, where 1 credit is equivalent to 1 academic year, class size was estimated using the average enrollment per school between 2004 and 2006, and five periods taught per day was based on discussions of common practice with state education officials. These values can be adjusted to match actual conditions in a given school.
2. Same assumptions as described in note 1.
3. Most states have assignment codes for each subject area, and teachers are often assigned to multiple codes. This should be taken into account to accurately reflect the FTE teacher supply.

Reference

Center for Education Performance and Information (2008). *Student data and reports*. Retrieved January 15, 2008, from http://www.michigan.gov/cepi/0,1607,7-113-21423_30451---,00.html.